TEMPERATURE.

Following an unusually warm December, January, 1912, began raw and cold, and during all of the first three weeks the temperature was continuously below normal, except on one day, namely, the 18th. On many of the days in this three-week period the average temperature ranged between 10° and 37° below normal. This remarkably prolonged cold period was in reality made up of three severe cold waves: (1) culminating about the 7th, with minimum temperatures ranging between zero and −23°, except in the extreme southern sections; (2) culminating about the 13th, with minimum temperatures ranging as low as −20° to −40°, and (3) culminating about the 16th, with minimum temperatures ranging from zero to −20°. As a rule the first cold wave was more severe over much of the western and central portions of the district than either of the other two, and the lowest temperature of the month was reached at that time at many places in those sections. However, the most intense cold was experienced over the greater portion of the northern and all of the northeastern sections of the district on the 13th, while the 16th was the coldest at many places in Kentucky and in the southeastern sections of the district.

The 18th, 22d, and 23d were comparatively warm, and the highest temperatures of the month, ranging from 45° to 60°, were registered on one of those days in Kentucky and in the more northerly sections of the district. In Tennessee and the more southerly sections, however, the temperature was notably high on the 26th and 27th, registering between 60° and 70°. From the 22d to the 29th, inclusive, the temperature was above normal over most of the western, central, and southern sections of the district, but continued quite cold over central Ohio and eastward from the 24th to the 28th, inclusive, while the last 2 days of the month were very cold over all of the district.

For the month as a whole the temperature averaged from 9° to 12° below normal in all the northern half of the district, including Kentucky, and it was the lowest for any January of record, while in many sections it averaged the lowest for any month of record, extreme low temperature records also being broken at many stations. Over Tennessee and sections to the southward the temperature averaged from 4° to 7° below normal, and while very cold, January average temperatures have been lower several times during the years for which records have been maintained.

PRECIPITATION.

The total amount of precipitation for the month, that is, the rainfall plus the water equivalent of the snowfall, was somewhat below the January normal in all parts of the district. The distribution was quite uniform, there being no large deficiency over any extensive area. On account of the low temperature which so largely prevailed, precipitation was mostly in the form of snow, there being a marked absence of the usual winter heavy rains. Snowfall was abundant over the district north of the Ohio River as well as over Kentucky and all the Appalachian sections of the district, the amount at the various stations ranging from 8 to 34 inches. Over Tennessee, North Carolina, and the northern portions of Georgia and Alabama snow was rather frequent but the amount with each storm was usually slight.

The ground was generally bare of snow during the first three or four days of the month, or until the general snowstorms of the 4th–7th. These snows with additions from time to time continued on the ground practically unmelted until the mild temperature and light rain of the 18th caused most of it to disappear; subsequently comparatively little remained on the ground other than in the higher elevations of the upper watersheds. There were additional snows and meltings during the last decade of the month, but the falls were mostly light and largely confined to Ohio and the western portions of Pennsylvania and Maryland. At the end of the month there were from 3 to 7 inches on the ground over the upper Allegheny watershed; less than 1 inch over the remaining portions of the watersheds of the upper Ohio and tributaries, and only a little here and there elsewhere in the district.

RIVERS.

All tributaries of the Ohio River above Pittsburgh were frozen over by the 8th. The Allegheny remained frozen the rest of the month, but the Monongahela and tributaries were open after the 18th, except where gorged by ice here and there. The Wabash River was frozen from the 5th to the 19th, and a threatening gorge formed near Mount Carmel, Ill., during the last decade of the month, causing flood stages of water and some damage. Good navigable stages of water were maintained in both the Tennessee and Cumberland Rivers throughout the month and there was very little trouble in those rivers from ice. The flood in the Cumberland at the beginning of the month subsided by the 6th without any material damage. Ice gorges formed at various places in the Ohio River, but no damage of consequence resulted. Navigation was closed over the greater portion of the Ohio River above the mouth of the Wabash from the 8th to the 19th on account of ice and ice gorges.

WINTER DAMAGE TO PEACHES.

[By J. WARREN SMITH, Professor of Meteorology, United States Weather Bureau.]

Investigation by the writer shows that whenever the temperature has fallen to about 17° below zero at Wauseon, Ohio, any time during the winter, there have been practically no peaches raised in the county in which Wauseon is located the following summer.

Prof. W. J. Green, of the Ohio Agricultural Experiment Station, states that in the most tender varieties of peaches buds will be killed with a minimum temperature of −12°, no matter how dormant the buds may be. Others may stand a temperature of 15° to 18° below zero.

Inasmuch as the lowest temperature during January, 1912, varied from 5° below zero at Columbus, Sandusky, and Toledo to over 30° below zero in some counties, the question as to the actual damage to the peach crop in Ohio is an interesting one.

In order to give all the light possible on the matter, the following table has been prepared. In this the stations have been grouped to show the differences in temperature under different conditions of exposure.

At Toledo the lowest recorded was only 5° below zero, but at Bowling Green, only a few miles away, it was −21°. At Sandusky the temperature was −5°, while at Vickery, only about 2 miles from the bay, it was −18°. At the Weather Bureau office in Cleveland the lowest was −8°, and at the St. Ignatius College station, only slightly farther from the lake, −13°. At Hillhouse, in Lake County, the temperature fell to −24° and at Conneaut, in Ashtabula County, to −22°. These figures all show that if the comparatively higher temperatures at Toledo, Sandusky, and Cleveland were due to the influence of Lake Erie the effect was not felt far from the shore of the lake.

It is probable, however, that the higher record in these places was due to some extent to city influence and not entirely to lake influence, and hence the peach crop has been damaged to some extent even close to the lake shore and on the islands near Sandusky.

A comparison of the difference in the record at the Columbus station and that at the Ohio State University (see the last stations in the table) shows the effect of the city combined with difference in elevation in determining the low temperatures on clear, still nights.

The thermometer at the Weather Bureau office in Columbus is in the center of the city at an elevation of 173 feet above the street level. The thermometer at the university station is in a shelter in the large grounds about 6 feet above the ground. The two points are about 3 miles apart.

The kiosk thermometer in the small statehouse grounds at a height of 5 feet showed a record of −8° the same morning. Thus 3° will represent the approximate difference due to elevation in this case and 15° the difference between the city temperature where cooling by radiation is largely prevented, and the country temperature, where the radiation from the surface of the earth is very rapid.

Other stations in the table show differences in temperature due to variations in elevations and topography.

At Hiram, for example, the lowest temperature was −10°, while at Garrettsville, only a few miles away but 255 feet lower, it was −30°. These records represent the difference in temperature between the hilltop and the valley on clear, still nights rather than the mere difference due to elevation. The difference between Cadiz and New Alexandria was only 7°, although the difference in elevation is practically the same as between Hiram and Garrettsville. But New Alexandria, although lower than Cadiz, is itself well up on the hillside.

The difference in temperature between hilltop and the valley is also well shown by the two Philo stations, which are only a few miles apart: No. 1, −7°; No. 2, −27°. The greatest difference, however, is indicated between Somerset, which is on a hilltop, and Milligan, located in a narrow cup-shaped valley. The station at Milligan has the lowest temperature record in the State for this month, −37°, and for the State as a whole, −39°, on February 10, 1899.

These data, with others in the table as well as in the general tables for the State, printed elsewhere in this review, indicate that there are probably some peach orchards situated on the highest elevations and possibly along the immediate Lake Shore, which have escaped a total loss. But that the peach buds are killed throughout the greater portion of Ohio is undoubted.

The tables indicate that the temperatures at Ironton, Portsmouth, and Cincinnati were not low enough to cause a total loss to the peach crop. Yet the instruments at each of these points are located in the city and must have been affected thereby as in the case of Columbus. The thermometer at Green, in southern Adams County, is in the open country, although close to the river and the record there was −20°.

When it is remembered that systematic orchard heating has kept the temperature from 10° to 15° higher within the orchard than prevailed outside there seems every reason to suppose that most of the peach crop in Ohio might have been saved during this cold spell. This would hardly have been possible in the low valleys, where the temperature fell to over 30° below zero, but it seems perfectly practicable along the lake and in other sections where it was only 5° to 10° below the danger point.

Record of low temperatures, Ohio, January, 1912.

Station.	County.	Elevation above sea level.	Lowest temperature.
Toledo	Lucas	769	− 5
Bowling Green	Wood	670	−21
Sandusky	Erie	629	− 5
Vickery	Sandusky	588	−18
Cleveland (1)	Cuyahoga	762	− 8
Cleveland (2)	do	754	−13
North Royalton	do	1,000	−11
Akron	Summit	1,081	−12
Medina	Medina	944	−24
Hillhouse	Lake	997	−24
Conneaut	Ashtabula	675	−22
Hiram	Portage	1,260	−10
Garrettsville	do	1,005	−30
Cadiz	Harrison	1,245	−10
New Alexandria	Jefferson	1,050	−17
Bangorville	Richland	1,380	−10
Cardington	Morrow	1,010	−21
Somerset	Perry	1,080	−10
Milligan	do	875	−37
Philo (1)	Muskingum	1,018	− 7
Philo (2)	do	750	−27
Demos	Belmont	1,325	−13
Clarington	Monroe	600	−20
Marietta	Washington	627	−21
Syracuse	Meigs	583	−13
Thurman	Gallia	696	−11
Ironton	Lawrence	575	−11
Portsmouth	Scioto	527	−12
Green	Adams	500	−20
Cincinnati	Hamilton	628	− 9
Camp Dennison	do	570	−27
Jacksonburg	Butler	975	−13
Hillsboro	Highland	1,063	−11
Frankfort	Ross	745	−31
Columbus	Franklin	918	− 5
Ohio State University	do	757	−23

THE CLIMATE OF THE CITY AND COUNTRY COMPARED.

[By J. WARREN SMITH, Professor of Meteorology.]

During clear nights the surface of the earth and objects upon it lose heat very rapidly by radiation. The air in contact with these surfaces loses its heat by conduction after the surfaces have cooled by radiation. As cold air is denser than warm air, it follows that if there is little wind blowing the air near the surface of the ground during the night grows colder than that a few feet above, especially in low or level places. Hence the air near the surface of the ground is always colder in clear, still nights in slight depressions than on the hillsides and over a low plain than it is in the more broken country.

The clearer and cleaner the air the more rapid the radiation also, hence it is found that the temperature of the air is always lower in country districts during clear, still nights than it is in nearby cities. This is particularly true in the winter time, when there is much smoke in the air over the cities and when convection currents are set up both by the heat from chimneys and from large office buildings in addition to those caused by the uneven surfaces presented by buildings of different heights, streets, yards, etc.

When such conditions do occur and there exists a marked difference in the temperature records in the city and country, the general opinion is expressed that the climate of the city is different from that of the country. Also that the Weather Bureau instruments, located as they usually are upon the roof of a tall office building, do not give true records.

Since 1882, in addition to the Weather Bureau records in the city of Columbus, Ohio, standard thermometers